WHAT IS CLAIMED IS:

1. A method for generating a projection of a received signal (y), said signal comprising H, a signal of the source of interest; S, the signals of all other sources and multi-path versions of the source of interest and composed of vectors $\mathbf{s}_1, \mathbf{s}_2, \mathbf{s}_3 ..., \mathbf{s}_p$; and noise (n); the method comprising the steps of:

determining a basis matrix U composed of basis vectors $u_1, u_2, \ldots u_p$;
storing elements of said basis matrix U; and
determining y_{perp} where:

$$\mathbf{y}_{\mathbf{perp}} = \mathbf{y} - \mathbf{U}(\mathbf{U}^{\mathbf{T}}\mathbf{U})^{-1}\mathbf{U}^{\mathbf{T}}\mathbf{y}.$$

2. The method recited in claim 1, wherein said step of computing basis vectors comprises the steps of:

A. assigning s_1 as a first basis matrix U;

B. decomposing s_2 into a component which is in said basis matrix U and a component that is not (u_2); and

C. redefining the basis matrix U to incorporate basis vector u_2.

3. The method recited in claim 2, wherein said step of computing basis vectors further comprises the steps of:

repeating steps B and C for each element of S.

4. The method recited in claim 2, wherein said step of computing basis vectors further comprises the steps of:

comparing u_i to a predetermined threshold and if u_i is greater than said threshold, adding u_i to the basis and repeating steps B and C for each element of S, else ignoring the u_i and continuing to repeat steps B and C.

5. The method recited in claim 2, wherein said step of computing basis vectors further comprises the steps of:

computing $1/\sigma_i$, where $\mathbf{u}_i^T \mathbf{u}_i = \sigma_i$; and

storing u_i and $1/\sigma_i$

6. The method recited in claim 2, wherein said step of computing basis vectors further comprises the steps of:

computing $\mathbf{u}_i = \mathbf{s}_i - \mathbf{u}_1 \frac{1}{\sigma_1} \mathbf{u}_1^T \mathbf{s}_i - \mathbf{u}_2 \frac{1}{\sigma_2} \mathbf{u}_2^T \mathbf{s}_i - \ldots\ldots - \mathbf{u}_{i-1} \frac{1}{\sigma_{i-1}} \mathbf{u}_{i-1}^T \mathbf{s}_i$;

storing u_i and $1/\sigma_i$; and

repeating said computing and storing steps if u_i is above a predetermined threshold, else ignoring this particular u_i.

7. The method recited in claim 1, wherein said step of determining y_{perp} comprises the step of calculating y_{perp} with the following formula:

$$\mathbf{y}_{perp} = \mathbf{y} - \mathbf{U} \begin{bmatrix} \frac{1}{\sigma_1} & 0 & . & . & 0 \\ 0 & \frac{1}{\sigma_2} & . & . & 0 \\ . & . & . & . & . \\ . & . & . & . & . \\ 0 & 0 & . & . & \frac{1}{\sigma_p} \end{bmatrix} \mathbf{U}^T \mathbf{y}.$$

8. The method recited in claim 1, wherein said step of determining y_{perp} comprises the step of calculating y_{perp} with the following formula:

$$\mathbf{y}_{perp} = \mathbf{y} - \mathbf{u}_1 \frac{1}{\sigma_1} \mathbf{u}_1^{\mathrm{T}} \mathbf{y} - \mathbf{u}_2 \frac{1}{\sigma_2} \mathbf{u}_2^{\mathrm{T}} \mathbf{y} - \ldots\ldots \mathbf{u}_{p-1} \frac{1}{\sigma_{p-1}} \mathbf{u}_{p-1}^{\mathrm{T}} \mathbf{y} - \mathbf{u}_p \frac{1}{\sigma_p} \mathbf{u}_p^{\mathrm{T}} \mathbf{y}$$

9. The method recited in claim 1, further comprising the step of determining y_s where:

$$\mathbf{y}_s = \mathbf{U}(\mathbf{U}^{\mathrm{T}}\mathbf{U})^{-1}\mathbf{U}^{\mathrm{T}}\mathbf{y}.$$

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10. A method for generating a projection from a received signal (y), said signal comprising H, a spread signal matrix of the source of interest; S, the spread signal matrix of all other sources of interest and composed of vectors $\mathbf{s}_1, \mathbf{s}_2, \mathbf{s}_3 ..., \mathbf{s}_p$; and noise (n); the method comprising the steps of:

A. assigning s_1 as a first basis vector u_1;

B. determining σ_i, where $\mathbf{u}_i^{\mathrm{T}} \mathbf{u}_i = \sigma_i$; and

C. storing u_i;

D. computing of inner products of the s_{i+1} and the u_1 through u_i vectors;

E. multiplying said inner product with a respective scalar $1/\sigma_i$ and thereby creating a first intermediate product

F. scaling each respective basis vector u_i by multiplying each respective first intermediate product with each respective basis vector u_i;

G. obtaining a vector sum from step F;

H. subtracting said vector sum from s_{i+1} to obtain the next basis vector u_{i+1};

I. comparing u_{i+1} to a predetermined value and if equal to or less than said value, discarding the u_{i+1} and going to step N;

J. storing u_{i+1};

K. determining an inner product of $u^T_{i+1}u_{i+1}$;

L. determining the reciprocal of step K which is $1/\sigma_{i+1}$;

M. storing $1/\sigma_{i+1}$;

N. incrementing i;

O. conducting steps D through N until i=p, where p is the total number of said sources of interest;

P. determining y_{perp} where:

$$\mathbf{y}_{\text{perp}} = \mathbf{y} - \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}.$$

11. The method recited in claim 10, wherein said computing step (D) is conducted in series.

12. The method recited in claim 10, wherein said computing step (D) is conducted in parallel.

13. The method recited in claim 10, wherein said multiplying step (E) is conducted in series.

14. The method recited in claim 10, wherein said multiplying step (E) is conducted in parallel.

15. The method recited in claim 10, wherein said scaling step (F) is conducted in series.

16. The method recited in claim 10, wherein said scaling step (F) is conducted in parallel.

17. The method recited in claim 10, wherein said storing step (C) also stores σ_i.

18. The method recited in claim 10, wherein said storing step (C) also stores $1/\sigma_i$.

19. The method recited in claim 10, wherein said inner product step (K) is conducted in series.

20. The method recited in claim 10, wherein said inner product step (K) is conducted in parallel.

21. A method for generating a projection from a received signal (y), said signal comprising H, a spread signal matrix of the source of interest; S, the spread signal matrix of all other sources of interest and composed of vectors $\mathbf{s}_1, \mathbf{s}_2, \mathbf{s}_3 \ldots, \mathbf{s}_p$; and noise (**n**); the method comprising the steps of:

A. assigning s_1 as a first basis vector u_1;

B. determining σ_i, where $\mathbf{u}_i^T \mathbf{u}_i = \sigma_i$; and

C. storing u_i;

D. computing of inner products of the s_{i+1} and the u_1 through u_i vectors;

E. multiplying said inner product with a respective scalar $1/\sigma_i$ and thereby creating a first intermediate product;

F. scaling each respective basis vector u_i by multiplying each respective first intermediate product with each respective basis vector u_i;

G. serially subtracting said intermediate product from s_{i+1};

H. utilizing the result from step G and subtracting the next incoming value of $\mathbf{u}_i \frac{1}{\sigma_i} \mathbf{u}_i^T \mathbf{s}_{i+1}$ until all the values are processed;

I. obtaining the next basis vector u_{i+1} from step H;

J. comparing u_{i+1} to a predetermined value and if equal to or less than said value, discarding u_{i+1} and going to step O;

K. storing u_{i+1};

L. determining an inner product of $u^T_{i+1}u_{i+1}$,

M. determining the reciprocal of step K which is $1/\sigma_{i+1}$;

N. storing $1/\sigma_{i+1}$;

O. incrementing i;

P. conducting steps D through O until i=p, where p is the total number of said sources of interest;

Q. determining y_{perp} where:

$$\mathbf{y}_{\mathbf{perp}} = \mathbf{y} - \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}.$$

22. The method recited in claim 21, wherein said computing step (D) is conducted in series.

23. The method recited in claim 21, wherein said computing step (D) is conducted in parallel.

24. The method recited in claim 21, wherein said multiplying step (E) is conducted in series.

25. The method recited in claim 21, wherein said multiplying step (E) is conducted in parallel.

26. The method recited in claim 21, wherein said scaling step (F) is conducted in series.

27. The method recited in claim 21, wherein said scaling step (F) is conducted in parallel.

28. The method recited in claim 21, wherein said storing step (C) also stores σ_i.

29. The method recited in claim 21, wherein said storing step (C) also stores $1/\sigma_i$.

30. The method recited in claim 21, wherein said inner product step (L) is conducted in series.

31. The method recited in claim 21, wherein said inner product step (L) is conducted in parallel.

32. An apparatus for generating a projection from a received signal (y), said signal comprising H, a signal of the source of interest; S, the signals of all other sources and composed of vectors $\mathbf{s}_1, \mathbf{s}_2, \mathbf{s}_3 ..., \mathbf{s}_p$; and noise (n); the apparatus comprising:

means for determining a basis vector U;

means for storing elements of said basis vector U; and

means determining y_{perp} where: $\mathbf{y}_{\mathbf{perp}} = \mathbf{y} - \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}$.

33. An apparatus for generating a projection from a received signal (y), said signal comprising H, a spread signal matrix of the source of interest; S, the spread signal matrix of all other sources of interest and composed of vectors $\mathbf{s}_1, \mathbf{s}_2, \mathbf{s}_3 ..., \mathbf{s}_p$; and noise (n); the apparatus comprising:

A. means for assigning s_1 as a first basis vector u_1;

B. means for determining σ_i, where $\mathbf{u}_i^T \mathbf{u}_i = \sigma_i$; and

C. means for storing u_i;

D. means for computing of inner products of the s_{i+1} and the u_1 through u_i vectors;

E. means for multiplying said inner product with a respective scalar $1/\sigma_i$ and thereby creating a first intermediate product;

F. means for scaling each respective basis vector u_i by multiplying each respective first intermediate product with each respective basis vector u_i;

G. means for obtaining a vector sum from step F;

H. means for subtracting said vector sum from s_{i+1} to obtain the next basis vector u_{i+1};

I. means for comparing u_{i+1} to a predetermined value and if equal to or less than said value, discarding this u_{i+1} and going to step N.

J. means for storing u_{i+1};

K. means for determining an inner product of $u^T_{i+1}u_{i+1}$;

L. means for determining the reciprocal of step K which is $1/\sigma_{i+1}$;

M. means for storing $1/\sigma_{i+1}$;

N. means for incrementing i;

O. means for conducting steps D through N until i=p, where p is the total number of said sources of interest;

P. means for determining y_{perp} where: $\mathbf{y}_{\mathbf{perp}} = \mathbf{y} - \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}$.

34. An apparatus for generating a projection from a received signal (y), said signal comprising H, a spread signal matrix of the source of interest; S, the spread signal matrix of all other sources of interest and composed of vectors $\mathbf{s}_1, \mathbf{s}_2, \mathbf{s}_3 ..., \mathbf{s}_p$; and noise (n); the apparatus comprising:

A. means for assigning s_1 as a first basis vector u_1;

B. means for determining σ_i, where $\mathbf{u}_i^T \mathbf{u}_i = \sigma_i$; and

C. means for storing u_i;

D. means for computing of inner products of the s_{i+1} and the u_1 through u_i vectors;

E. means for multiplying said inner product with a respective scalar $1/\sigma_i$ and thereby creating a first intermediate product;

F. means for scaling each respective basis vector u_i by multiplying each respective first intermediate product with each respective basis vector u_i;

G. means for serially subtracting said intermediate product from s_{i+1};

H. means for utilizing the result from step G and subtracting the next incoming value of $\mathbf{u}_i \frac{1}{\sigma_i} \mathbf{u}_i^T \mathbf{s}_{i+1}$ until all the values are processed;

I. means for obtaining the next basis vector u_{i+1} from step H;

J. means for comparing u_{i+1} to a predetermined value and if equal to or less than said value, going to step O;

K. means for storing u_{i+1};

L. means for determining an inner product of $u^T_{i+1}u_{i+1}$,

M. means for determining the reciprocal of step K which is $1/\sigma_{i+1}$;

N. means for storing $1/\sigma_{i+1}$;

O. means for incrementing i;

P. means for conducting steps D through O until i=p, where p is the total number of said sources of interest; and

Q. means for determining y_{perp} where: $\mathbf{y}_{\text{perp}} = \mathbf{y} - \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}$.

35. A method for generating a projection of a received signal (y), said signal comprising H, a signal of the source of interest; S, the signals of all other sources and multi-path versions of the source of interest and composed of vectors $\mathbf{s}_1, \mathbf{s}_2, \mathbf{s}_3 ..., \mathbf{s}_p$; and noise (n); the method comprising the steps of:

determining a basis matrix U composed of basis vectors $u_1, u_2, \ldots u_p$;
storing elements of said basis matrix U;
determining y_{perp} where:

$$\mathbf{y}_{perp} = \mathbf{y} - \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}$$; and

determining y_s where:

$$\mathbf{y}_s = \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}.$$

36. The method recited in claim 10, further comprising the step of determining y_s where:

$$\mathbf{y}_s = \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}.$$

37. The method recited in claim 21, further comprising the step of determining y_s where:

$$\mathbf{y}_s = \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}.$$

38. An apparatus for generating a projection from a received signal (y), said signal comprising H, a signal of the source of interest; S, the signals of all other sources and composed of vectors $\mathbf{s}_1, \mathbf{s}_2, \mathbf{s}_3 ..., \mathbf{s}_p$; and noise (n); the apparatus comprising:

means for determining a basis vector U;

means for storing elements of said basis vector U;

means for determining y_{perp} where: $\mathbf{y}_{perp} = \mathbf{y} - \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}$.

means for determining y_s where:

$$\mathbf{y}_s = \mathbf{U}(\mathbf{U}^T\mathbf{U})^{-1}\mathbf{U}^T\mathbf{y}.$$